

## Claims

What is claimed is:

- 5     1.     A tunable, switchable electromagnetic filter comprising:
  - an electromagnetic resonator;
  - a switch coupled to the resonator and to ground;
  - an impedance element coupled to the resonator, wherein the resonator,
  - the switch and the impedance element comprise a switchable filter;
  - 10           a ferroelectric tunable component electromagnetically coupled to the switchable filter;
  - a tuning control signal generator for generating a tuning signal,
  - coupled to the ferroelectric tunable component;
  - a switching control signal generator for generating a switching signal,
  - 15         coupled to the switch.
2.     The filter of claim 1, further comprising a microelectrical mechanical switch.
3.     The filter of claim 1, further comprising a voltage source coupled to the component.
4.     The filter of claim 1, further comprising a ferroelectric capacitor.
- 20    5.     The filter of claim 1, further comprising a voltage source coupled to the switch.
6.     The filter of claim 1, further comprising a ferroelectric capacitor having a quality factor at about 1.9 GHz equal to about 50 or greater.

7. The filter of claim 1, further comprising a second resonator coupled to the first resonator and wherein the impedance element is coupled between the first and second resonators.
8. The filter of claim 7, further comprising:
- 5           an input capacitor coupled at a first end of the input capacitor to an input port of the filter and at a second end of the output capacitor to the impedance element and the first resonator; and
- an output capacitor coupled at a first end of the output capacitor to an output port of the filter and at a second end of the output capacitor to the impedance element and the second resonator.
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9. The filter of claim 8, further comprising a second tunable ferroelectric component coupled to the filter.
10. The filter of claim 9, wherein the impedance element, the input capacitor and the output capacitor comprise, respectively, a third, a fourth and a fifth tunable
- 15           ferroelectric component.
11. The filter of claim 7, wherein the first and second resonators comprise monoblock resonators.
12. The filter of claim 1, wherein the filter resonates at a frequency between about 1850 MHz and about 1910 MHz.
- 20   13. The filter of claim 1, wherein the filter resonates at a frequency between about 1930 MHz and about 1990 MHz.
14. The filter of claim 1, wherein the filter resonates at a frequency between about 824 MHz and about 849 MHz.

15. The filter of claim 1, wherein the filter resonates at a frequency between about 869 MHz and about 894 MHz.
16. The filter of claim 1, wherein the filter resonates in a half wave mode.
17. The filter of claim 1, wherein the filter resonates in a quarter wave mode.
- 5 18. A method of modifying a resonant frequency of a filter comprising:
- resonating a resonator in a first operating mode, the resonator being coupled to a MEMS switch;
- generating a switching control signal;
- switching a state of the MEMS switch, responsive to the switching control signal;
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- changing a grounding condition of a port of the resonator, responsive to the state of the MEMS switch;
- producing a second operating mode of a resonator, responsive to the grounding condition;
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- generating a tuning control signal;
- varying an impedance of a ferroelectric component, responsive to the tuning control signal;
- adjusting a resonance frequency of the resonator, responsive to the impedance of the ferroelectric component.